

2004 GALVESTON BAY INVASIVE SPECIES RISK ASSESSMENT

INVASIVE SPECIES SUMMARY

Created by: Environmental Institute of Houston, University of Houston-Clear Lake
and the Houston Advanced Research Center

Common Name: German cockroach
Latin Name: <i>Blattella germanica</i>
Category: Terrestrial Animal
Place of Origin: “The German cockroach has become the most widespread of the domiciliary cockroaches. It is thought to have originated around the Great Lakes area of Africa, - Ethiopia, Sudan. Its spread into Europe occurred over a thousand years ago, being carried in cargo from its native Africa to the north African coast and then across the Mediterranean Sea in Greek ships, eventually spreading to Asia Minor, and Russia. Its establishment in western Europe resulted in it quickly becoming established in all regions of the civilized world. The insect was first named <i>Blatta germanica</i> by Linnaeus in 1767. It is also found in Australia with the first reported German cockroach in 1893 (http://www.roberth.u-net.com/germanica.htm).”
Place of Introduction: Central North America and Canada
Date of Introduction: Unknown
Life History: “The German cockroach has three life stages typical of insects with incomplete metamorphosis: the egg, nymph, and adult. The entire life cycle is completed in about 100 days. However, factors such as temperature, nutritional status, and strain differences may influence the time required to complete a life cycle. German cockroaches breed continuously with many overlapping generations present at any one time. Under ideal conditions, population growth has been shown to be exponential. Actively growing field populations are comprised of 80 percent nymphs and 20 percent adults. (http://creatures.ifas.ufl.edu/urban/roaches/german.htm).”
Growth/Size: The adult is 10-15 mm long.
Feeding Habits/Diet: “The German cockroach is omnivorous, eating table scraps, pet food, and even book bindings (http://creatures.ifas.ufl.edu/urban/roaches/german.htm).”
Habitat: “The German cockroach is found throughout the world in association with humans. They are unable to survive in locations away from humans or human activity. The major factor limiting German cockroach survival appears to be cold temperatures. Studies have shown that German cockroaches were unable to colonize inactive ships during cool temperatures and could not survive in homes without central heating in northern climates. The availability of water, food, and harborage also govern the ability of German cockroaches to establish populations, and limit growth (http://creatures.ifas.ufl.edu/urban/roaches/german.htm).”
Attitude (aggressive, etc.): “German cockroaches adulterate food or food products with their feces and defensive secretions, physically transport and often harbor pathogenic organisms, may cause severe allergic responses, and in extremely heavy infestations have been reported to bite humans and feed on food residues on the faces of sleeping humans. In addition, some scientists suggest that German cockroach infestations may cause human psychological stress and that the stigma associated with infestations alters human behavior. For example, people with infested houses do less entertaining, and avoid the kitchen at night for fear of encountering a cockroach (http://creatures.ifas.ufl.edu/urban/roaches/german.htm).”
<p>Physical Description:</p> <p>“Egg. Eggs are carried in an egg case, or ootheca, by the female until just before hatch occurs. The ootheca can be seen protruding from the posterior end (genital chamber) of the female. Eggs will often hatch from the ootheca while the female is still carrying it. A typical egg case contains 30 to 40 eggs. The egg case is a tiny, brown, purse-shaped capsule. It is about 8 mm long, 3 mm high, and 2 mm wide.</p> <p>Larva or Nymph. The nymphal stage begins with egg hatch and ends with the emergence of the adult. Nymphs are dark brown to black in color, with distinct dark parallel bands running the length of the pronotum. Nymphs do not possess wings. The number of molts required to reach the adult stage varies, but the most frequently reported number of molts is six. The stage between molts is called an instar. At room temperature nymphs complete development in about 60 days. All developmental stages actively forage for food and water.</p> <p>Adult. The adult is 10-15 mm long, brown to dark brown in color with two distinct parallel bands running the length of the pronotum. The sexes can be distinguished by the following characteristics: male - body thin and slender, posterior abdomen is tapered, terminal segments of abdomen visible, not covered by tegmina (leathery outer wings); female - body stout, posterior abdomen is rounded, entire abdomen just covered by tegmina.” (http://creatures.ifas.ufl.edu/urban/roaches/german.htm).</p>

Management Recommendations / Control Strategies: include references for existing site-specific strategies

“Action Threshold

Since the German cockroach is considered an aesthetic pest, the action threshold for this insect depends upon the tolerance of the people living in the infested dwelling. However, most people associate cockroach infestations with poor sanitary conditions and typically go to excessive lengths to eradicate them from their houses.

Management

Insecticides in the organophosphorous, carbamate, pyrethroid, amidinohydrazone, insect growth regulator, inorganic, microbial, and botanical classes are available for controlling German cockroaches. Insecticide treatments are available in a wide variety of formulations including baits, sprays (emulsifiable concentrates, wettable powders, microencapsulated), dusts, and powders.

[Least Toxic Methods of Cockroach Control](#). (This document is ENY-258, one of a series of the Entomology and Nematology Department, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida. First published: April 1993. Revised: May 1999. Please visit the EDIS Website at <http://edis.ifas.ufl.edu>. Additional information on these organisms, including many color photographs, is available at the Entomology and Nematology Department WWW site located at <http://www.ifas.ufl.edu/~entweb/entomolo.htm>.)

[German Cockroach Management in Low Income Housing](#). (This document is ENY-257, one of a series of the Entomology and Nematology Department, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida. Publication date: March 1994. Revised: May 1999. Please visit the EDIS Website at <http://edis.ifas.ufl.edu>. Additional information on these organisms, including many color photographs, is available at the Entomology and Nematology Department WWW site located at <http://www.ifas.ufl.edu/~entweb/entomolo.htm>.)

Non toxic and low toxic alternatives for German cockroach control are available. Sticky traps can be used to monitor or reduce population size. Improving sanitation by eliminating food and water sources and clutter can have a significant impact on reducing the chances of infestation population size. Finally, exclusion practices such as sealing cracks and crevices will reduce harborage space and also negatively impact population size (<http://creatures.ifas.ufl.edu/urban/roaches/german.htm>).”

“Ohio State University Extension Fact Sheet

Integrated Pest Management (IPM) is a systems approach that combines preventive techniques, non-chemical pest control methods and the wise use of pesticides with preference for products that are least harmful to human health and the environment. It is not the total elimination of pesticides but an alternate approach to traditional pest control measures. Complete reliance, in the past, on pesticides alone for pest control allowed certain pests to develop resistance, created potential human exposure to harmful chemicals, produced unsound environmental contamination, and created a threat to nontarget species and pesticide waste. IPM consists of routine inspection and monitoring with treatment only when pests are actually present, thus reducing traditional, routine pesticide application treatment (calendar date sprays) whether pests were present or not.

By following a cockroach IPM plan, cockroach activity is monitored using sticky traps or glue boards. These monitoring stations are placed throughout a structure where roaches are likely to be found such as in dark places along cabinets, walls, under appliances, on pipes, etc., in bathrooms and kitchens. Any tight cracks about 3/8 inch or smaller are good cockroach habitats. Monitoring indicates whether roaches are present and if control practices are working. IPM tools include glue boards, baits, vacuum cleaners, caulking, insect growth regulators (IGRs), etc.

Detection

German cockroaches can be detected by examining the premises after dark with a flashlight. During the day, probing hiding places with a wire or thin wood strip will expose roaches. Adults and nymphs usually hide clustered together. Household sprays of pyrethrins applied to hiding places will flush out roaches, sometimes killing them if they contact the spray.

Prevention and Sanitation

German roaches can move from one building to the next during the summer, entering through cracks in foundations, around loose-fitting doors or windows, and along water and gas pipes. Repair leaky water faucets and pipes. Seal openings such as cracks in foundation walls, exterior walls around air conditioners, doors, windows, floors, ceilings, around plumbing fixtures, electrical outlets, baseboards, etc. with putty, plastic wood or other caulking material. Inspect for roaches and their egg cases in sacks, cartons, boxes, used appliances and furniture, etc., brought into the home. Sanitation is critical in roach control. (Unclean living conditions from housekeeping neglect is the major contributing factor of roach outbreaks.) Clean areas beneath cabinets, sinks, stoves, refrigerators, etc. as well as cupboards, pantry shelves and food storage bins. Clean up spilled foods and liquids. Avoid leaving scraps of food on unwashed dishes and countertops overnight. Keep food in tightly sealed containers, rinse cans and bottles before putting in the trash, and transfer garbage outdoors into roach-proof receptacles away from the house. Leftover pet food should not remain in the feeding dish overnight.

Resistance

To date, only the German cockroach has developed a degree of resistance that presents control problems. There is a natural evolutionary process accelerated by intense selection pressure created through the use of insecticides. (The more insecticide applied, the greater the selection for resistance.) **Never increase dosages.** For example, by killing off susceptible cockroaches, there remains an untouched resistant roach that becomes a larger segment of the remaining population. As a result, insecticides that at one time controlled a largely susceptible population are no longer effective against the remaining altered population and most of its descendants. (Resistance is passed from parent to offspring as an inherited trait and not acquired during the cockroach's life.)

Some German cockroaches in apartment buildings have been found resistant to certain carbamate, organophosphate, chlorinated hydrocarbon and pyrethroid insecticides. These roaches have shown high resistance to malathion, Ficam and Baygon and lower resistance to diazinon, Dursban and Orthene. For difficult to control populations, use unrelated insecticides (different chemical classes) in a sequential treatment pattern. (Use in a rotation, one after another, over a short period of time.) For example, in the first month use an organophosphate, the second month use a carbamate, the third month use silica gel, the fourth month boric acid and the fifth month resmethrin. By using insecticides that attack the insect at different points in its body, the insect's defense system is overwhelmed. However, some carbamates and organophosphates have similar action sites where "cross-resistance" may occur. For example, selection with Baygon induces the same resistance spectrum as diazinon.

Insecticides

Apply chemicals at roach hiding places. Enter a dark room quietly, turn on the light, and watch where the roaches run. Spot treat these hiding places and known pathways, especially under and behind loose baseboards or molding strips and around pipes or conduits along the walls and through them. Do not treat entire floors, walls or ceilings. Roaches may hide around the kitchen sink or drain board, in cracks underneath cupboards and cabinets, inside the motor compartment of mechanical refrigerators, behind window and door frames, in radio and TV cabinets, and around closet and bookcase shelves. Surfaces where food is prepared should not be treated. Roaches in buildings with multiple dwellings usually require the treatment of other units as well.

There are numerous cockroach insecticide formulations. Some are labeled "general use" for homeowner application, and others are labeled "restricted use" for professional pest control or licensed, certified pesticide applicators only. Before using any insecticide, **read the label** and follow directions and safety precautions.

Dusts such as bendiocarb (Ficam D), boric acid powder, pyrethrins (Drione) or silica aerogel (Dri-Die) can be applied with a puff duster into hiding places normally hard to reach with a spray.

Sprays, either oil-based or water emulsion, are applied as spot or crack and crevice treatments. These include propoxur, acephate, chlorpyrifos, diazinon, permethrin or resmethrin. Only the licensed certified pest control applicator may apply bendiocarb, propetamphos, trichlorfon, cyfluthrin, cypermethrin, deltamethrin, esfenvalerate, lambda-cyhalothrin, tralomethrin and bifenthrin. Insect growth regulators or IGRs include hydroprene (Gentrol) and pyriproxyfen (Archer, Nylar) which act on immature growth stages by contact or ingestion, disrupting molting and development to fertile adults. (A combination of an IGR followed up by use of a bait is often effective.) Some still use contact insecticides in mist or ULV (ultra-low volume) machines to treat the entire indoor area. Open all drawers and closet doors so roach hiding places can best be treated. However, the trend is toward less sprays and aerosols and more IGRs and baits.

Baits

Certain segments of the public such as schools, hospitals, and office buildings may prefer baits to sprays. Baits include pastes, gels, particle baits and bait stations.

Bait advantages: low hazard (toxicity) to people; suited for sensitive accounts; IPM oriented; offer effective control. Disadvantages: high bait cost; precise placement required; not cost effective in heavy roach infestations.

Sticky traps have openings at both ends with the inside surface covered with a very sticky adhesive and slow-release food attractant. Properly placed traps, to and from roach hiding and feeding areas, can catch numerous adults and nymphs daily, especially brownbanded and German cockroaches. Traps are best used along with preventive and insecticidal applications to monitor populations. Trapping can determine harborage areas and infestation severity, monitor effectiveness of pesticide applications, and detect any roach population increases which may require additional pesticide treatments.

Fumigation is seldom used but will clean out a cockroach infestation. It must be applied only by a licensed, certified pesticide applicator. If a severe cockroach infestation develops or if you are in doubt as to the control measures to use, contact a reputable, licensed pest control firm who has the chemicals, training and experience to do a thorough job (<http://ohioline.osu.edu/hyg-fact/2000/2099.html>)."

References (includes journals, agency/university reports, and internet links):

1. <http://creatures.ifas.ufl.edu/urban/roaches/german.htm>
2. (<http://www.roberth.u-net.com/index.htm>) Veterinary Entomology: Insects of veterinary importance
3. (<http://www.roberth.u-net.com/germanica.htm>) Veterinary Entomology: Insects of veterinary importance
4. (<http://ohioline.osu.edu/hyg-fact/2000/2099.html>) William F. Lyon. German Cockroach. Ohio State University Extension Fact Sheet: HYG-2099-97
5. [Least Toxic Methods of Cockroach Control](#). (This document is ENY-258, one of a series of the Entomology and Nematology Department, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida. First published: April 1993. Revised: May 1999. Please visit the EDIS Website at <http://edis.ifas.ufl.edu>. Additional information on these organisms, including many color photographs, is available at the Entomology and Nematology Department WWW site located at <http://www.ifas.ufl.edu/~entweb/entomolo.htm>.)
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